

**This Page is Inserted by IFW Indexing and Scanning
Operations and is not part of the Official Record**

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ **BLACK BORDERS**
- ☐ **IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- ☐ **FADED TEXT OR DRAWING**
- ☐ **BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- ☐ **SKEWED/SLANTED IMAGES**
- ☐ **COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- ☐ **GRAY SCALE DOCUMENTS**
- ☐ **LINES OR MARKS ON ORIGINAL DOCUMENT**
- ☐ **REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- ☐ **OTHER:** _____

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.

(12) UK Patent Application (19) GB (11) 2 327 012 (13) A

(43) Date of A Publication 06.01.1999

(21) Application No 9811689.0

(22) Date of Filing 01.06.1998

(30) Priority Data

(31) 970030975 (32) 04.07.1997 (33) KR

(71) Applicant(s)

Samsung Electronics Co. Ltd.
(Incorporated in the Republic of Korea)
416 Maetan-3-Dong, Paldal-Gu, Suwon-City,
Kyungji-Do, Republic of Korea

(72) Inventor(s)

Yong-In Cho

(74) Agent and/or Address for Service

Dobb Lupton Alsop
Fountain Precinct, Balm Green, SHEFFIELD, S1 1RZ,
United Kingdom

(51) INT CL⁶

H04Q 7/32, B60R 11/02, H04M 1/60

(52) UK CL (Edition Q)

H4K KBHX

H4J JL

(56) Documents Cited

GB 2174268 A US 5546458 A

(58) Field of Search

UK CL (Edition P) H4J JGF JGP JL, H4K KBHX, H4L
LECX

INT CL⁶ B60R 11/02, H04M 1/60 9/08, H04Q 7/32
On-Line - WPI

(54) Abstract Title

Hands free apparatus with multiple microphones

(57) A hands free apparatus for use with a mobile phone has multiple microphones 201-20n installed in different places of a vehicle. A switching module 210 compares the voice signals input from the microphones and switches the hands free apparatus body 100 to a selected microphone of which the voice signal output has the highest intensity. In this way, at least two and, preferably, all the persons in the vehicle can make use of the hands free function.

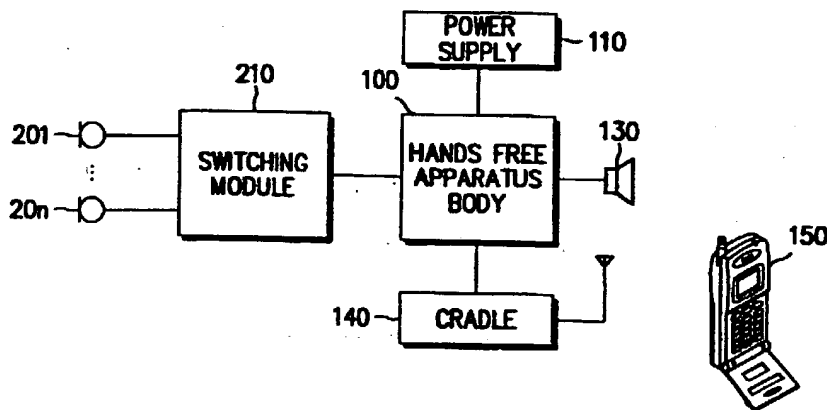


FIG. 2

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

This print takes account of replacement documents submitted after the date of filing to enable the application to comply with the formal requirements of the Patents Rules 1995

GB 2 327 012 A

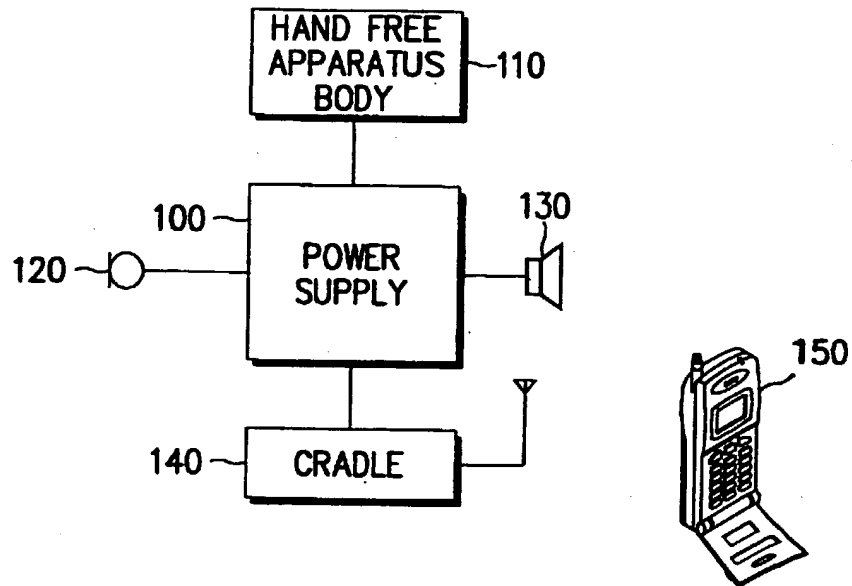


FIG. 1

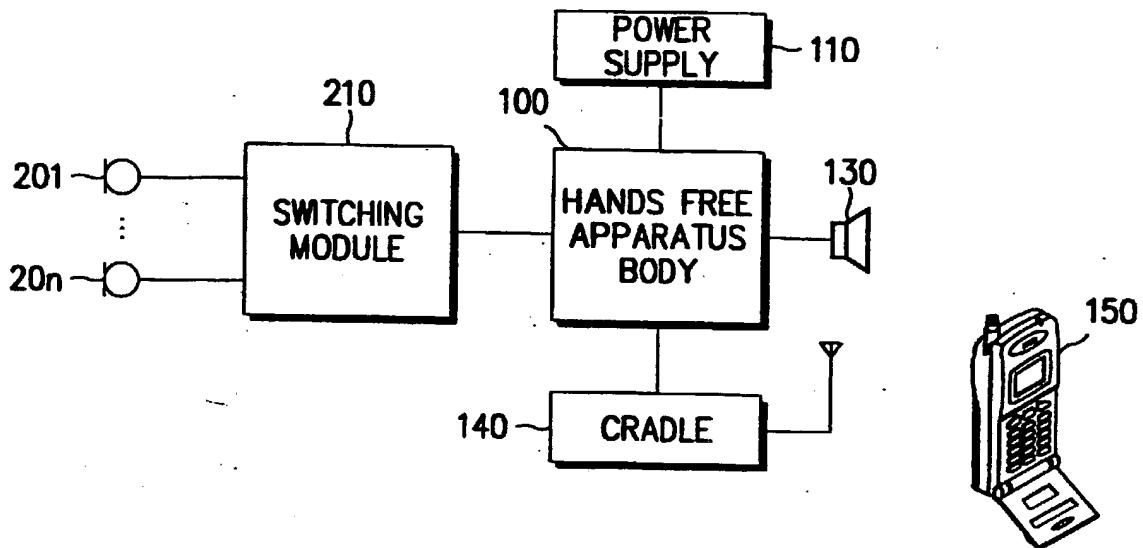


FIG. 2

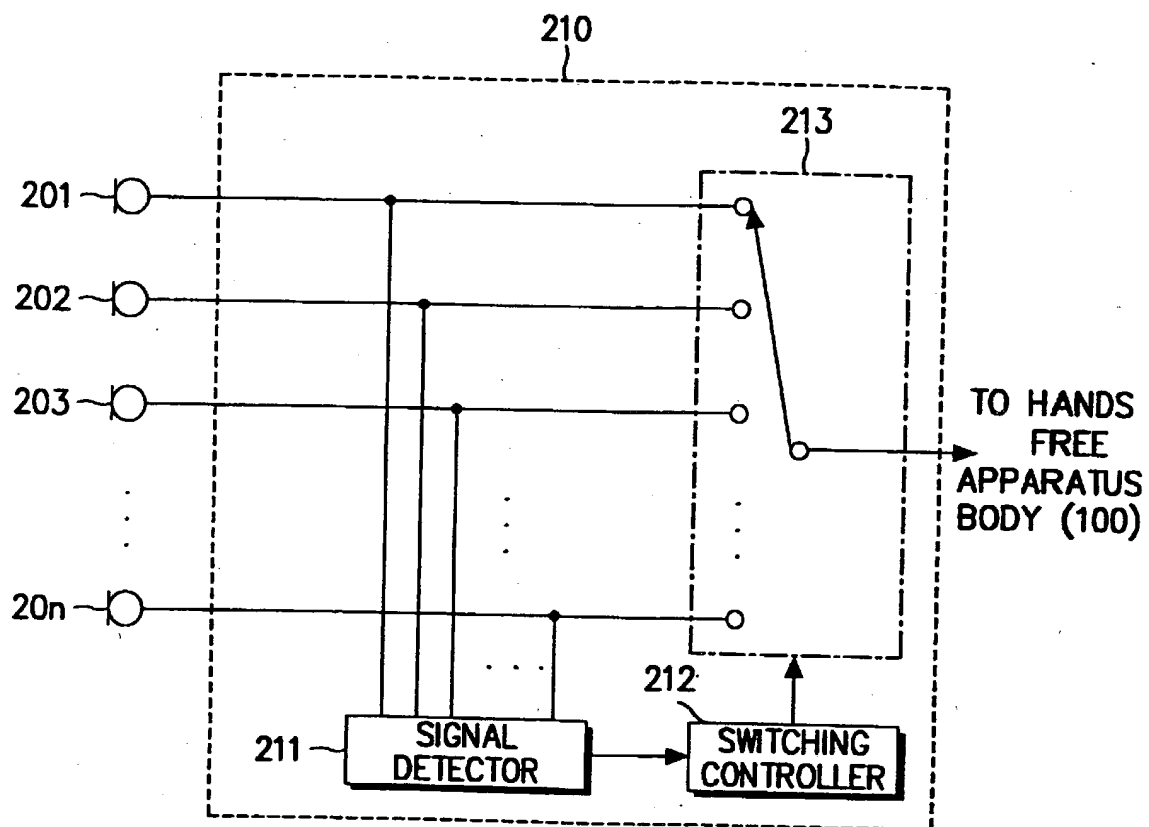


FIG. 3

HANDS FREE APPARATUS WITH MULTIPLE MICROPHONES5 Background of the invention

The present invention relates to a hands free apparatus for a mobile radio telephone, particularly but not exclusively, for use in a vehicle, and a vehicle
10 containing such apparatus as well as a method for use in such apparatus.

In recent times, with the spread of mobile radio telephones, telephone calls are frequently made in
15 vehicles whilst the engine is running. In particular, when a driver makes or gets a telephone call to or from another party while driving the vehicle, he/she is required to hold the mobile radio telephone in one hand and drive the vehicle with the other hand. Therefore, the driver may
20 become careless whilst driving, which may cause a traffic accident. To reduce the possibility of a traffic accident due to the careless driving and to offer convenience to the driver, hands free apparatus for mobile radio telephones have been developed and are widely used. FIG.
25 1 shows a block diagram of a hands free apparatus for a mobile radio telephone according to the prior art.

Referring to FIG. 1, a conventional hands free apparatus for a mobile radio telephone includes a hands free
30 apparatus body 100, a power supply 110, a microphone 120, a speaker 130, a cradle 140, and a mobile radio telephone 150. In operation, the hands free apparatus body 100 is provided with a supply voltage from the power supply 110 and processes a voice signal input from the microphone 120
35 installed in the vehicle and provides the processed voice signal to the mobile radio telephone 150 via the cradle 140. Furthermore, the voice signal input via the mobile

radio telephone 150 is applied to the hands free apparatus body 100 via the cradle 140. The hands free apparatus body 100 processes the received voice signal and outputs it to speaker 130.

5

As described above, the conventional hands free apparatus includes one microphone installed in a specific place of the vehicle (e.g., in a place adjacent to the driver's seat). Thus, a fellow passenger in the vehicle, if any,
10 cannot easily make use of the hands free function.

Summary of the invention

According to the invention, there is provided a hands free
15 apparatus for a mobile radio telephone, comprising:

- a hands free apparatus body installable in a vehicle;

- at least two microphones installable in a vehicle spaced apart from one another; and

20 a switching module for comparing voice signals from the microphones and switching to a selected microphone for which the voice signal output has the highest intensity.

Preferably, the number of microphones is sufficient to
25 install at least one adjacent each seat of a vehicle.

Preferably, the number of microphones is 4, 5 or 6.

Preferably, the switching module comprises:

30 a signal detector for measuring voice signals from the microphones to generate measurement signals corresponding to the intensity of the voice signals;

- a switching controller for comparing the measurement signals with one another to generate a switching control
35 signal; and

- a switching circuit for switching the hands free apparatus body to the selected microphone for which the

voice signal output has the highest intensity.

In a further aspect there is provided a vehicle comprising hands free apparatus as herein described, in which the
5 microphones are installed in different places in the vehicle.

Preferably, the microphones are installed in different sections of the vehicle.

10

Preferably, at least one microphone is installed adjacent front seats of a vehicle and at least one microphone is installed adjacent seats rearward of the front seats.

15 Preferably, at least one microphone is installed adjacent each seat of the vehicle.

In a further aspect there is provided a method for controlling a hands free apparatus having a plurality of
20 microphones installed in different places of a vehicle, comprising the steps of:

measuring intensities of voice signals input from the microphones;

comparing the intensities of the voice signals with
25 one another to detect the voice signal having the highest intensity; and

switching a mobile radio telephone to a selected microphone for which the voice signal output has the highest intensity.

30

Preferably, the method comprises the step of repeating the steps of measuring, comparing and switching periodically.

Thus, the present invention provides a hands free
35 apparatus with multiple microphones.

Preferably, the present invention provides a hands free apparatus which enables two or more and, preferably everyone travelling in the vehicle to make use of the hands free function.

5

Preferably, the hands free apparatus includes a mobile radio telephone.

Brief description of the drawings

10

The invention will now be described, by way of example only, with reference to the attached drawings.

FIG. 1 is a block diagram of a hands free apparatus for a 15 mobile radio telephone according to the prior art.

FIG. 2 is a block diagram of a hands free apparatus for a mobile radio telephone according to an embodiment of the present invention.

20

FIG. 3 is a detailed block diagram of a switching module (210) of FIG. 2.

Detailed description of the preferred embodiment

25

Referring to FIG. 2, a hands free apparatus for a mobile radio telephone according to an embodiment of the present invention includes a hands free apparatus body 100, a power supply 110, a speaker 130, a cradle 140, a mobile 30 radio telephone 150, a plurality of microphones 201-20n, and a switching module 210. The microphones 201-20n are installed in different places in the vehicle. For example, one or more microphones are installed adjacent to every seat in the vehicle.

35

As illustrated in FIG. 3, the switching module 210 consists of a signal detector 211 for detecting intensity

of the voice signals input from the microphones 201-20n, a switching circuit 213 for switching the hands free apparatus body 100 to one of the microphones 201-20n, and a switching controller 212 for controlling the switching circuit 213.

Now, referring to FIGs. 2 and 3, the hands free apparatus according to the present invention will be described in detail. The switching module 210 receives the voice signals from the microphones 201-20n, and switches the hands free apparatus body 100 to the microphone for which the voice signal output has the highest intensity.

Specifically describing an operation of the switching module 210, the signal detector 211 measures the voice signals input from the respective microphones 201-20n, and provides the switching controller 212 with the measurement signals. The switching controller 212 compares the measurement signals output from the signal detector 211 with one another to detect the voice signal having the highest intensity, and generates a switching control signal according to the comparison. The switching circuit 213 receives the switching control signal output from the switching controller 212 and switches the hands free apparatus body 100 to the microphone for which the output voice signal has the highest intensity according to the switching control signal.

The hands free apparatus body 100 provided with the supply voltage from the power supply 110, processes the selected voice signal input from the switching module 210 and provides the voice signal to the mobile radio telephone 150 via the cradle 140. As well known in the art, the signal processing is performed by amplifier/attenuator and an echo canceller.

Meantime, the voice signal received from the mobile radio telephone 150 is applied to the hands free apparatus body 100 via the cradle 140. The hands free apparatus body 100 processes the received voice signal and outputs it to the 5 speaker 130.

As described above, the hands free apparatus for the mobile radio telephone has a plurality of microphones installed in different places of the vehicle, so that at 10 least two and preferably all the people in the vehicle can make use of the hands free function.

Typically, all the microphones are identical or have similar amplification properties so a direct comparison of 15 output signals is meaningful in deciding which microphone is being used. If different microphones are used, calibration may be used.

Where the microphones are installed in different sections 20 of the vehicle, these are typically the front, ie adjacent the front seat, and rear, ie adjacent the rear seats, of the vehicle.

Switching to different microphones can take place 25 periodically. Thus, different people in the vehicle, can take part in the same telephone call.

CLAIMS

1. A hands free apparatus for a mobile radio telephone, comprising:
 - 5 a hands free apparatus body installable in a vehicle;
at least two microphones installable in a vehicle spaced apart from one another; and
a switching module for comparing voice signals from
10 the microphones and switching to a selected microphone for which the voice signal output has the highest intensity.
2. A hands free apparatus according to claim 1, in which the number of microphones is sufficient to install
15 at least one adjacent each seat of a vehicle.
3. A hands free apparatus according to claim 1 or 2 in which the number of microphones is 4, 5 or 6.
- 20 4. A hands free apparatus according to any preceding claim, in which the switching module comprises:
 - a signal detector for measuring voice signals from the microphones to generate measurement signals corresponding to the intensity of the voice signals;
 - 25 a switching controller for comparing the measurement signals with one another to generate a switching control signal; and
a switching circuit for switching the hands free apparatus body to the selected microphone for which the
30 voice signal output has the highest intensity.
5. A vehicle comprising hands free apparatus according to any preceding claim, in which the microphones are installed in different places in the vehicle.
35
6. A vehicle according to claim 5, in which the microphones are installed in different sections of the

vehicle.

7. A vehicle according to claim 5 or 6, in which at least one microphone is installed adjacent front seats of a vehicle and at least one microphone is installed adjacent seats rearward of the front seats.

8. A vehicle according to claim 5, 6 or 7 in which at least one microphone is installed adjacent each seat of the vehicle.

9. A method for controlling a hands free apparatus having a plurality of microphones installed in different places of a vehicle, comprising the steps of:

15 measuring intensities of voice signals input from the microphones;

comparing the intensities of the voice signals with one another to detect the voice signal having the highest intensity; and

20 switching a mobile radio telephone to a selected microphone for which the voice signal output has the highest intensity.

10. A method according to claim, comprising the step of repeating the steps of measuring, comparing and switching periodically.

11. A hands free apparatus for a mobile radio telephone substantially as described herein with reference to and/or as illustrated in figures 2 and/or 3.

12. A vehicle substantially as described herein with reference to and/or as illustrated in figures 2 and/or 3.

35 13. A method for controlling hands free apparatus substantially as described herein with reference to and/or as illustrated in figures 2 and/or 3.



The Patent Office

9

Application No: GB 9811689.0
Claims searched: 1 to 13

Examiner: Jared Stokes
Date of search: 13 October 1998

Patents Act 1977 Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.P): H4K (KBHX)
H4J (JGF,JGP,JL)
H4L (LECX)

Int Cl (Ed.6): B60R (11/02)
H04M (1/60, 9/08)
H04Q (7/32)

Other: On-Line - WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
Y	GB 2 174 268 A (Shure Bros) See whole document, especially page 3 lines 25-33	1-10
Y	US 5 546 458 (Mitsubishi) See whole document, especially column 5 lines 29-39	1-10

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.